

What is claimed is:

- 1     1.     A vacuum debris removal system for an integrated circuit manufacturing  
2     device, comprising:  
3             a plate;  
4             an slit formed in the plate;  
5             a pair of vacuum tubes, one disposed on each side of the slit; and  
6             a single opening formed in each of the vacuum tubes at a selected  
7     location.
- 1     2.     The vacuum debris removal system of claim 1, wherein the selected location  
2     of each single opening is at about a mid-point of the slit.
- 1     3.     The vacuum debris removal system of claim 1, wherein the selected location  
2     of each single opening is in a side of each vacuum tube facing the slit.
- 1     4.     The vacuum debris removal system of claim 1, wherein each single opening  
2     has a predetermined size and shape.
- 1     5.     The vacuum debris removal system of claim 4, wherein each single opening  
2     has a length of about 0.060 inches and a width of about 0.030 inches.
- 1     6.     The vacuum debris removal system of claim 1, wherein the slit is  
2     substantially rectangular and the pair of vacuum tubes extend substantially parallel  
3     to each longest side of the slit to at least about a mid-point of the slit.
- 1     7.     The vacuum debris removal system of claim 1, wherein the slit is elongate  
2     and the vacuum tubes extend respectively parallel to each longest side of the slit.  
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- 2     8.     The vacuum debris removal system of claim 1, wherein the selected location  
3     of each opening causes air flow in the slit to a central location.

1 9. The vacuum debris removal system of claim 1, wherein the selected location  
2 of each opening causes air flow in the slit away from an element of an integrated  
3 circuit manufacturing device.

1 10. The vacuum debris removal system of claim 1, wherein the selected location  
2 of the openings causes a maximum reduction of outgassed particles from a resist  
3 material contaminating a lens element of an integrated circuit manufacturing device.

1 11. The vacuum debris removal system of claim 1, wherein the selected location  
2 of the openings causes air flow in the slit for dual withdrawal of particles away from  
3 an element of an integrated circuit manufacturing device.

1 12. The vacuum debris removal system of claim 1, wherein each vacuum tube of  
2 the pair of vacuum tubes draws between about 3.5 and about 7 cubic feet per hour of  
3 air.

1 13. A vacuum debris removal system for an integrated circuit manufacturing  
2 device, comprising:  
3 at least one vacuum tube; and  
4 an opening formed in the at least one vacuum tube at a selected location  
5 to cause air flow away from an element of the integrated circuit manufacturing  
6 device.

1 14. The vacuum debris removal system of claim 13, wherein the opening has a  
2 predetermined size and shape.

1 15. The vacuum debris removal system of claim 14, wherein the opening has a  
2 length of about 0.060 inches and a width of about 0.030 inches.

1 16. The vacuum debris removal system of claim 13, wherein the selected  
2 location of the opening causes a maximum reduction of outgassed particles from  
3 contaminating a lens element of the integrated circuit manufacturing device.

1 17. The vacuum debris removal system of claim 13, wherein the selected  
2 location of the opening is at a mid-point of an exposure slit of the integrated circuit  
3 manufacturing device.

1 18. An apparatus for manufacturing a semiconductor device, comprising:  
2 a stage to hold a semiconductor wafer during processing;  
3 an exposure slit positioned relative to the stage;  
4 projection optics to focus a light beam through the exposure slit and onto  
5 a selected portion of the semiconductor wafer;  
6 at least one vacuum tube adjacent the exposure slit; and  
7 a single opening formed in the vacuum tube at a selected location to  
8 cause air flow in the exposure slit away from a lens of the projection optics.

1 19. The apparatus of claim 18, wherein the selected location of the single  
2 opening is at about a mid-point of the exposure slit.

1 20. The apparatus of claim 18, wherein the single opening has a predetermined  
2 size and shape.

1 21. The apparatus of claim 18, further comprising  
2 a second vacuum tube adjacent the exposure slit on an opposite side of  
3 the exposure slit from the at least one vacuum tube; and  
4 a single opening formed in the second vacuum tube at a selected  
5 location.

1 22. The apparatus of claim 21, wherein the selected location of each single  
2 opening is at about a mid-point of the exposure slit.

1 23. The apparatus of claim 21, wherein the selected location of the single  
2 openings causes a maximum reduction of outgassed particles from contaminating  
3 the lens.

1 24. A method of making a vacuum debris removal system, comprising:  
2 providing at least one vacuum tube; and  
3 forming a single opening in the at least one vacuum tube at a selected  
4 location to cause air flow away from an element of an integrated circuit  
5 manufacturing device.

1 25. The method of claim 24, further comprising forming the single opening to  
2 have a predetermined size and shape.

1 26. The method of claim 24, further comprising selecting the location to form  
2 the single opening to be at about a mid-point of an exposure slit of the integrated  
3 circuit manufacturing device.

1 27. The method of claim 24, further comprising:  
2 disposing the at least one vacuum tube on one side of an exposure slit of  
3 the integrated circuit manufacturing device;  
4 disposing a second vacuum tube on an opposite side of the exposure slit;  
5 and  
6 forming a single hole in the second vacuum tube to cause air flow in the  
7 exposure slit away from the element of the integrated circuit manufacturing device.

1 28. A method of removing debris, comprising:  
2 disposing at least one vacuum tube adjacent an exposure slit of an  
3 integrated circuit manufacturing device; and  
4 forming a single opening in the at least one vacuum tube at a selected  
5 location.

1 29. The method of claim 28, further comprising forming the single opening to  
2 have a predetermined size and shape.

1 30. The method of claim 28, further comprising selecting the location to form  
2 the single opening to be at about a mid-point of the exposure slit.

1 31. The method of claim 28, further comprising:  
2 disposing a second vacuum tube on an opposite side of the exposure slit  
3 from the at one least vacuum tube; and  
4 forming a single hole in the second vacuum tube to cause air flow in the  
5 exposure slit away from a lens element of the integrated circuit manufacturing  
6 device.